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THE COMMITTEE ON EDUCATIONAL RESEARCH
Faculty of Education
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Editorial

Science so dominates our lives, both culturally and economically, that its place as a major study at all school levels must be acknowledged. In the Red Brick universities this has already been done. Even at Oxford recognition of science as central is forcing a readjustment of balances, the arts becoming ancillary to mathematics and science. Mr. J. P. Corbett, in The Listener of November 1, speaking of his own subject, Philosophy, writes, 'It purported to be what it had been, the axle upon which all thought revolved, but in fact it was largely spinning in a void.' And further on, more generally, he says, Oxford "will either be forced to make science the centre of its studies or will become an ornament on the national mantelpiece."

Science is important not only in itself as pure theory, not only as an aid to economic effort in raising standards of living, but as a weapon in international competition. The latter aspect has of late impressed its urgent importance upon not only scientists, but upon statesmen and educators. Any nation hoping to keep its head above the agitated waters must produce an adequate number of scientifically trained people, and this training must begin early.

And so what of our high schools? At the start we are bedeviled by our disparate and conflicting high school aims: to train as we say for life or living, to disclose vistas of interest, and to lay the grounds for further training leading to specialization. If only the right students would pursue the right aims and stick to them all would be well, or relatively so. In at least the larger schools, suitable courses appropriate to each aim could be devised. We are bedeviled, in the second instance, by a vicious circle: unchallenging courses in science, listless students, and a scarcity of adequately trained science teachers. The circle's viciousness is obviously exacerbated in an age of spreading technology by high wages outside teaching. Whether scientific subject matter should be presented divisionally by subject, in correlation, or in fusion appears yet to be in debate. What does seem clear is that science teaching must begin early, mastery of theory must be assured, and specialization begun no later than Grade XII.

If philosophy must jettison much of its earlier content, as Mr. Corbett affirms, so perhaps should social studies and the arts generally. Of history specifically Mr. Corbett writes, "What happened in the United States in the ninteenth century, in Russia in the early twentieth, and is happening in China now is of incomparably more importance to the rising generation—than anything that happened in Europe more than 300 years ago."

Elsewhere in this issue Mr. Ian MacDonald considers the growth of science and its likely impact upon education.

EDUCATION IMPORT OF THE GROWTH OF LEARNING

IAN C. MACDONALD
Journalist

One of the chief characteristics of life generally and of human life in particular is growth. We have good reason to appreciate this today. On every side we can see things growing, not only living things but populations, governments, industries, urban centres, school systems, universities, traffic, utilities, organizations, and so forth. In every case the growth reveals certain features: increase in dimensions or mass or numbers; more and more specialization; increasing complexity; and the development of communications systems. There usually rises, in addition, a demand for ever more and ever better inter-communication, to counteract the effects of increases in specialization and complexity.

All this growth may be attributed primarily to biological urges and the nature of man but at several removes from the biological level it may be largely attributed to the growth of learning. The students of population tell us that it is not so much high birth rates as reduced death rates which are responsible for the unprecedented growth of populations at the present time; and it is the application of new knowledge in medicine, public health, sanitation, nutrition, and so forth, which has reduced the death rates. Indeed, to over-simplify in order to put it very briefly, the growth manifested on every side is mainly due to the growth of scientific and technical learning, which during the past century or more has been proceeding at a rate probably much higher than that for the growth of the human inheritance of learning in general.

In any event, it can be shown, as we shall see presently, that scientific and technical learning has been growing very rapidly during the present century. It may be supposed that this growth has some meaning for formal education, especially for scientific and technical work, if only because the transmission of learning must be regarded, at the very least, as one of the prime functions of formal education. But what *is* the meaning?

The writer has attempted to answer this question in a large thesis submitted to the University of Alberta in the fall of 1956.[1] This thesis undoubtedly could be boiled down but the information and the argument are rather extensive to be compressed into a few

[1]"Effects of Growth of the Inheritance of Learning: The Meaning of the Growth of Scientific Information for Education for the Advancement of Scientific Knowledge"—submitted for the degree of Master of Education.

thousand words without leaving many gaps. All that will be attempted in the present article is a sketch of the data presented in the first part of the thesis, an outline of the results of analysis in the second part, and a digest of the conclusions respecting educatiton reached at the end of the second part and in the third.[2]

I—NATURE OF THE GROWTH

To begin with, consider briefly the growth of the inheritance of learning in general. This growth is indicated by the increases in university library collection.[3] The average holdings of ten university libraries founded in the United States prior to 1821 have been doubling every sixteen years since 1821. The average now exceeds 3,000,000 bound volumes, half of which have been acquired within the past sixteen years! But this does not tell the whole story. The Harvard library contains more than 5,000,000 volumes.

Assume that the Harvard collection was built up somewhat earlier and that half of it was acquired within the past thirty-five years. Subtract from these 2,500,000 volumes any light fiction titles, any reprints of titles originally published prior to 1900 and any volumes published between 1900 and 1922 which might be considered as having been superseded. Make generous allowance for duplication in the material within the covers of the volumes. The number of volumes and the amount of material remaining *still* would dwarf the capacity of the single mind and the time for learning at the disposal of the individual. In relation to the output of the multitude, ignorance is bound to be the lot of every man.

However, let us come down to a somewhat more practical level and consider the problems with which the growth of published scientific and technical information confronts the individual specialist. Although he must pay attention to some books, he is primarily concerned with the information being published in scientific and technical periodicals. The number of these periodicals doubled during the second quarter of this century and now is about 50,000. They are publishing at least 350,000 and more likely 500,000 to 600,000 *useful* papers and articles per year.[4] The gross output of

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[2]To conserve space, and because specific references here would mean very little, sources will not be cited. Documentation will be assumed to be given under "1". Bibliography will be found under "1" pp. 291-305.

[3]The size of a representative university collection cannot, it is true, be regarded as a direct measure of the amount of accumulated learning or knowledge; for there must be much duplication and much that is superfluous in such a collection. Its size is a measure of the amount of published information in which knowledge is embedded. But to find the knowldege the learner must wade through a large proportion of the published information in any field.

[4]By **useful** is meant those deemed worth summarizing for notices in abstracting or indexing periodicals. The editors of such periodicals, which speed the investigator's search for information relevant to his own work, are highly selective in choosing the papers and articles to be summarized in a couple of paragraphs or a few lines.

papers and articles in the periodicals has been estimated at up to 1,850,000. An analysis of the available figures shows that the annual output, at least in the useful category, has been increasing, except during the two war periods, throughout the present century; it now is much higher than it was only twenty years ago. As a result, the accumulation of useful scientific and technical information, with embedded knowledge, has been growing exponentially and thus doubling in a certain period of years—probably about fifteen. The accumulation now is mountainous.

A search for pertinent scientific or technical information is not generally carried back more than twenty years in the periodical "literature". When account is taken of this reducing factor, the net doubling period turns out to be about forty years, which is less appalling than fifteen years. Yet the twenty-year accumulation for 1934-53, which falls in the useful category and must be considered actually or potentially of value to current endeavor in science and technology, probably amounts to around 7,500,000 papers and articles. This is to say nothing of books (properly speaking and not including bound volumes of periodicals) which it may be advisable for the investigator to consult because they draw together, organize in some coherent way and interpret in a fresh light masses of information which have accumulated in periodicals.

It would be quite impossible, of course, for any individual to read more than a very small fraction of the primary information published in a year. As Sir Edward Appleton of Great Britain put it some years ago, anyone who set himself the task of merely reading, let alone understanding, all the journals of fundamental science would discover at the end of the first year that he was already ten years behind. If he were to include the technical "literature" as well, the end of the first year would see him one hundred years behind. The trouble is, however, that it is becoming extremely difficult to keep abreast even in a very limited sector. Similarly, a search of the whole accumulation of twenty years would be impossible for the individual; but, unfortunately, even a search in a limited sector is becoming extremely difficult. Indeed, as many scientists and engineers have testified since the end of the Second World War, and were testifying even earlier, the flood of current "literature" is becoming a substantial impediment to the pursuit of scientific and technical research.

These men speak, to cite a few examples, of the investigator being "staggered by the findings and conclusions of thousands of other workers . . . which he cannot find time to grasp, much less to remember, as they appear"; of "torrents and rivers of current

literature pouring themselves into libraries . . ."; of the progress of science "being impeded by the fact that the most brilliant men simply do not have enough learning capacity to acquire all the details of more than increasingly narrow segments of the field of knowledge"; of "a truism" that "no scientist can read all that is of value to him and still have time for his own research". Yet the communication of results, which is at once the cause of the flood and the origin of the trouble, is essential for the pursuit of scientific inquiry—information is "the lifeblood" of science, and technology. Every individual who penetrates or pushes back the frontier of the unknown is standing on the shoulders of his predecessors and charting his course, from that vantage point, with the help of contemporaries who are advancing in the same or in some related direction. Or, as a Canadian scientist has suggested, inquiry is like a chain reaction in which many individuals are continuously bombarding one another with fresh results and new ideas, and knocking still more results and ideas out of one another's minds.

II—EFFECTS ON SCIENTIFIC ENDEAVOR

A comprehensive analysis of the effects of the growth of scientific and technical information (and embedded knowledge) upon scientific and technical endeavor cannot be presented in this space. However, some of the conclusions to which such an analysis leads can be stated fairly briefly.

Consider, first, direct effects of volumetric growth. It is, of course, generating more growth, but it also is:

(1) making it increasingly difficult and in some cases impossible to keep up with current output even in a narrow sector, the difficulty being the greater, the wider the area of interest;

(2) making search and documentation exceedingly difficult, especially when the investigator must delve into the legacy of the past upon which present achievements usually must be founded; exhaustive search under a heading which requires reaching into a number of sectors or fields has become in most cases impractical in terms of time and effort;

(3) slowing down and interrupting the whole circulation or exchange of information so vital to scientific and technical endeavor.

Increasing Specialization

A major effect, due to the ever-growing disparity between the current and accumulated production of the multitudes of investigators and the limited capacity of the single mind, is increasing

specialization. This, in turn, has had subsidiary effects such as the following.

Specialized concentration of inquiry, when complemented by effective intercommunication, has done much to advance science and technology. It has been partly responsible for powerful additions to the tools at the disposal of the investigator—instruments, mathematical and logical systems, modes of operation, and so forth. It has provided the detailed knowledge essential to the theoretical merging of physics and chemistry at the microcosmic extreme (quantum theory), the partial merging of chemistry and biology in the microcosmic realm of biochemistry, and the formulation of the modern synthesis of evolution.

But, once made, such gains exact their price from succeeding investigators. The use of a larger tool-set demands knowledge of more tools and greater versatility in experiment and observation. To take full advantage of coalescing theory the investigator may have to acquire a greater variety of knowledge and in his inquiry embrace a wider area, which would put him up against the problems of search, documentation and keeping up with the flood in aggravated form. Moreover, in vast regions of science and technology, specialization, notwithstanding its advantages, hinders many an investigator in the search for new knowledge by leaving him ignorant of much outside his specialty which is relevant to his inquiry; by narrowing his vision or leading him into a picayune concentration of attention; by increasing the likelihood of his misinterpreting results gathered in unfamiliar territory; by reducing or preventing communication with others engaged in different but pertinent specialties; by reducing the cross-fertilization so often fruitful for investigators in different areas. It is partly responsible, too, for the multiplication and the individual growth of dialects which, because of their specialized terms, are fully and correctly understood only by initiates. These dialects often cause difficulty or confusion in communication, though within a major division of science or technology they show many terms in common, and though this also is the case for two divisions where these have coalesced; e.g., for physics and chemistry at the microcosmic extreme.

Growing Complexity

The volumetric growth of information at an accelerating rate, as it dwarfs individual capacity more and more, fosters ever more and ever narrower specialization, and this in turn not only increases the fragmentation of information but generates ever more information, though quite possibly a declining proportion of useful information. That, in the abstract, may be regarded as the primary cycle. How-

ever, another aspect of the process can be seen: a growing complexity both in the fabric of information and embedded knowledge and in the pattern of endeavor. So great is this complexity even now that the whole structure of information and knowledge and endeavor has been aptly termed a maze.

Responses to the increase in complexity take two main forms:

(a) There is an effort to improve communication among individuals and groups with a view to making the pattern of endeavor more coherent and the results of endeavor more synthetic; i.e., with a view to making endeavor more effective in putting things back together again.

(b) There is a strong inclination on the part of the individual not merely to shy away from breadth in inquiry because of the difficulty of achieving breadth, which fixes existing specialization, but even to specialize still more narrowly, which of course must add to the difficulty of intercommunication.

Response (a) has been facilitated by the coalescence of physics and chemistry at the microcosmic extreme (the atomic but not necessarily the nuclear level), by the partial merging of chemistry and biology at the molecular, microcosmic extreme and by the formulation of the modern synthesis of evolution, and also, to a lesser degree, by the formulation of theories of relativity and of modern cosmology at the macrocosmic extreme in physics. However, from the standpoint of science as a whole, this response has, at the same time, been made more difficult by "horizontal" growth in science; that is, for instance, by the broadening of the region embraced by biology and by expansion of inquiry in the region of social science where the subjects of investigation are even more complex than in biology.

Specializing still more narrowly (response 'b') is tantamount to carrying to still greater extremes the application of the rule, divide and isolate, to the subjects of investigation—a tactic which is analogous to analysis in the actual conduct of inquiry. The application of the rule may be extended thus in the hope of finding basic elements common to two or more areas of investigation. A gain in this direction is to be welcomed but it is not likely to be consummated without much help from (a), which evidently is the primary necessity in the face of the increase of complexity.

Not So Simple

Another significant and troublesome result of the growth is the discovery of more and more complexity in the systems of the natural world which are under scientific investigation. As analysis has

been refined and pressed deeper in search of still simpler elements and still more fundamental principles, with which fresh and more powerful syntheses might be formulated, it has become increasingly evident that things are not nearly so simple as they once seemed. In effect, the fruit of analysis has been the revelation of complexity.

Those assertions could be illustrated with many examples from macrocosmic and microcosmic physics, chemistry and biology but all that will be attempted here is a superficial statement on one from physics and on one from biology.

The quantum theory of atomic systems, virtually completed in the early thirties, gives a fairly satisfactory and a workable account of the physics of the atom, but as experimental analysis was pressed deeper into the nucleus of the atom it revealed a bewildering multiplicity of interdependent or interacting, fundamental "particles"—still more complexity at a deeper level—for which a coherent theory or consistent description has yet to be formulated.

In its simple form, largely attributable to Pasteur, the germ theory held that disease (of certain kinds) was due to an invasion by microbes. Futher study has convinced many biologists that that simple theory is not tenable—"disease is a complex process that depends on the interactions of an injurious agent, a susceptible patient and a particular environment". Natural resistance may be, in some cases of microbial disease, a more important factor than the virulence of the germs.

While analysis, the application of the rule, divide and isolate, continues to reveal complexity, we are not, in general, well equipped to deal with it directly. If the threshold of complexity be defined as the interaction of two elements, then it can be shown that in physics, generally regarded as the most advanced of the sciences, we are unable to produce an "exact" mathematical solution of a state of complexity beyond the threshold level. For instance, in celestial mechanics, in a problem involving three or more interacting bodies resort must be had to such a method of solution as successive approximation. This may give sufficiently accurate results for all practical purposes, but it may also gloss over or leave unexplained a highly significant discrepancy, as general relativity has demonstrated.

The discovery of more and more complexity in systems under investigation may eventually demand radical departures from the predominantly analytical traditions and modes of language, mathematics and thought, though analysis will remain indispensable. Without analysis, indeed, the existence of a state of complexity cannot be determined.

Communication and Language

Some of the effects of the growth upon scientific and technical endeavor have now been briefly described. Many efforts to overcome or at least to offset these effects are being made. There is no space to discuss them here. But what is required essentially is improvement of communication: between investigators who are contemporaries, between the investigator and his predecessors via the record of their results, between the investigator and the natural world via experiment and observation. This means that the investigator must gain better command of the means of communication: verbal, mathematical and graphic forms of language; reading, writing and speaking; the methods of scientific and technical inquiry. There is a great and growing need, for instance, for clearer and more concise writing of papers, and for more use of plain English, or the appropriate plain vernacular tongue, which not only is the only language common to all those who must communicate about scientific and technical matters but also is the leaven in the bread of "technical" discourse without which this discourse may collapse of its own weight.

But it is not enough simply to improve the investigator's command of the arts of communication and inquiry; he must *know*, if he is to have something to communicate, if he is to understand what another is trying to communicate, if he is to cross the frontier between the known and the unknown with sufficient strength to explore the new ground extensively in depth or breadth or in both dimensions. Yet one of the main effects of the growth is the dwarfing of individual capacity by the accumulated output of the multitude of investigators. How is the investigator to avoid or to offset this dwarfing, let alone acquire more knowledge, relatively speaking, than his predecessors of ten or twenty or fifty years ago had at their individual command? This is an educational problem, which will be discussed presently, but one conclusion can be drawn at this point: that the investigator must acquire knowledge in its most compact and powerful form, as much as possible. Generally speaking, then, he must focus his learning on basic principles and fundamental theories, in which scientific and technical knowledge is, so to speak, compressed into a shorthand, and which also are powerful instruments for further inquiry. The educational road to the mastery of this form of knowledge is, of course, long and hard; but this is a matter which will be dealt with presently.

III—MEANING FOR EDUCATION

In spite of the unavoidable sketchiness of the presentation in the preceding sections of the effects and problems of growth as these have developed within the scheme of scientific and technical endeavor, it should be obvious to the reader that the situation has some meaning for education for scientific and technical work. However, to make this meaning clear in some detail, it will be necessary to set out certain of the educational problems arising from the growth and then to consider what the solution of these problems demands in the nature and the design of educational programs and courses. Only a summary discussion can be presented here.

The main problems may be stated compactly as follows:

(A)—The volumetric growth is continuously increasing the amount of information and knowledge which the investigator needs for his work, and thus, also, the amount of ground which *apparently* needs to be covered in formal studies, and the period of time which *apparently* needs to be devoted to formal learning.

Yet the danger of overloading the mind and that of learning merely "less and less about more and more" have to be avoided; one must reckon with the need for pace in learning; the student-investigator needs to be educationally equipped to begin scientific work early enough to get full advantage of youthful energy, originality and productivity; and his formal learning period cannot be indefinitely prolonged, nor his attainment of normal adult status as wage-earner and private householder be indefinitely postponed, without detriment to his personal well-being.

(B)—In learning as in inquiry, which is hardly surprising when each partakes of the nature of the other, specialization sooner or later becomes inescapably necessary for the individual. Limited capacity, individual talent and aptitude, and the advantages of concentration of effort—all these demand it. Moreover, it is essential to get below the surface and plumb the depths in any field of knowledge.

But with the volumetric growth, any given degree of specialization becomes narrower and narrower in relation to the total mass of information and knowledge. Moreover, the degree of specialization, measured by any fixed standard, is likely to be increased because the frontier of knowledge is being pushed back and the road to be travelled by the learner is being lengthened. The danger is that the individual may, so to speak, "learn more and more about less and less, until he knows everything about nothing". This is certainly to be avoided.

(C)—The learner is faced with the need of achieving both greater depth and more breadth in his education, the former because inquiry is being pressed ever deeper into the nature of things, the latter because of coalescence or merging and in order to counteract the adverse effects of specialization. In short, he needs to acquire both deeper and broader knowledge, in spite of the limitations of individual capacity and the limited time and effort which can be given to learning in the period of formal studies. How is this need to be met?

(D)—Due to the problems of complexity and those associated with the more and more extreme states into which investigators are looking, together with certain other factors, fundamental inquiry is becoming increasingly difficult, especially when it comes to the formulation of comprehensive theories. The student-investigator, therefore, needs qualitatively better education for his work, especially though not only if it is to include basic

research. The upward trend in qualitative requirements may be expected to persist. This tends to increase the difficulty and the size of the educational task, and the time needed for it.

A theoretical resolution of these problems will now be presented in condensed form. For this purpose, the problems have been set out in a table with some elaboration. Referring to this table, it should be noted that the apparent demands, far from being of the "once and for all" sort, are persistent and have to be regarded as ever-increasing. The adverse prospect is what is to be expected if the attempt to meet the demand should exceed the limiting conditions. The pitfall of reaction to the adverse prospect, in each case, should be regarded merely as typical or representative. It is assumed that the period of formal studies should not exceed a limit; twenty years all told. In (B) Primary (See Table, columns 1 and 2), the limiting condition rests on a assumption that there is a minimum of intercommunication below which returns from inquiry would diminish.

More Knowledge

Further specialization has long been used as a mode of escape from the difficulties involved in attempting to satisfy the (A)-P demand and also to elude the demand itself. But the hope of thus eluding the demand has, in practice, been disappointed. What is more, further specialization may make its own adverse prospect a reality, and many scientists think this (B)-P penalty is already being incurred. Then, however useful specialization may be for avoiding the penalty and the pitfall of (A)-P, it will not do for eluding (A)-P; and, in any case, to elude the demand is not to satisfy it.

Any attempt to meet the demand, to some extent, within the period of formal studies, will require the elimination of non-essentials from program and courses, to make more room for the acquirement of knowledge and of the arts of learning. Is there anything which can be and even should be eliminated?

The rapid growth of scientific and technical knowledge and the even more rapid development and diversification of technology on the basis of this knowledge have made accelerating change the dominant characteristic of economic, social and political life. As a result, the requirements of existing forms of endeavor and vocations are rapidly changing, some vocations are gradually becoming obsolescent, new lines of work are being created, and the educational requirements for earning a living and meeting the responsibilities of citizenship are generally being raised. The "technical" details and routines of current practice are most susceptible to change. Some are fading out almost daily; indeed, those which appear in

(1)	(2) Apparent Demand Primary	(3) Secondary	(4) Limiting Conditions	(5) Adverse Prospect	(6) Pitfall Of Reaction	(7) Mode of Escape
(A) More knowledge			Capacity and time of the individual	Overloading student	Superficiality in courses and learning	Specialization
		More time for formal learning	Earning living Family needs Productivity	Prolonging formal learning	Rejection of formal learning	
(B) Further specialization			Necessity of intercommunication	Narrowing to point of diminishing returns	Superficial broadening courses	
		More time to reach frontier	See (A)—Secondary	See (A)—Sec.	See (A)—Sec.	
(C) Both greater depth and more breadth			As for (A)—Primary	As for (A)—Primary	Between the two stools	
		(A)—Sec. augments by (B)—Sec.	(A)—Sec.	(A)—Sec.	(A)—Sec.	
(D) Qualtitatively better education			Capacity of individual	(Unspecified)	(Unspecified)	
		More education	(A)—Sec.	(A)—Sec.	(A)—Sec.	

textbooks may be obsolete before they are taught. In any case, they often differ greatly from one commercial establishment or government department to another. Thus, there is little point in teaching them; and by reducing them to a minimum in formal studies more room can be obtained for any attempt to meet (A)-P.

Another way of making more room is to focus learning on basic principles and fundamental theories of proven durability. The student, as already noted, should strive for and acquire knowledge in these most compact and powerful forms as rapidly as possible, as scientists and others are testifying in growing numbers. But this will require the student to follow a hard road and one which is growing somewhat longer as inquiry is pressed deeper into the systems of the natural world. In trying to resolve the volumetric problem by this means, therefore, we are faced with the secondary problem of time—(A)-S. How can more time be made available for essential learning within the limited period of formal studies.

The school week and the school year, or both, could be lengthened, as in some European countries, but this could cause faltering in pace or lead into the (A)-S pitfall. By grouping or enriching within the grade at certain levels, the more able students could be permitted to learn at a higher rate and thus economize on their time; we shall have to come to this eventually. In addition, time-wasting and unessential paraphernalia, courses and practices in present programs could be drastically reduced or eliminated, partly by putting the student more on his own mettle and partly by deliberately cutting them out. Must not this be done sooner or later?

Since the demands (A)-P and (A)-S are persistent and ever-increasing, the adoption of the above means for meeting them in part is a matter of sheer necessity.

Further Specialization

Specialization is, for the individual, inescapable in scientific inquiry and demonstrably fruitful. In learning, it also is inescapable and fruitful as it permits the student to dig below the surface of the field and make a penetration in depth to the fundamentals. But specialization must be complemented by effective intercommunication; and, as already noted, with increasing specialization and complexity, the investigator must gain better command of the arts of communication (and of inquiry). So, also, during the period of formal studies. The study or at any rate the improvement of command of these arts must be vigorously pursued throughout the period of formal studies, including the postgraduate stage, and, indeed, beyond. This may add to the load on the student in advanced stages, as compared with present loads, but the additional invest-

ment of time and effort should be offset by increasingly rich dividends as the student advances higher in formal studies and passes on into professional work.

Still, the problem presented by the (B)-P demand remains, only partly resolved by the improvement of communication. If students are not to be fitted out with intellectual blinkers, even the present degree of specialization in many cases must be mitigated. But how? By broadening the science courses in school and university and by giving more "broadening" courses in the humanities at university? The accumulation both in the scientific and in the humane domain of scholarship is enormous, and inexorably increasing. How, then, is broadening to be achieved, within the limits of student capacity and time, without falling into the pitfall of superficiality?

The (B)-P problem, it is plain, leads into the problem (C)-P. How are both depth and breadth to be achieved, actually, because of the growth, ever greater depth and ever more breadth? This, without overloading the student or merely falling ineffectually between the two stools.

Depth and Breadth

The theoretical resolution of (C)-P, so the writer submits, is determined by these considerations:

(a) Specialization itself testifies that the impossibility of the individual keeping up with the increasing breadth of the scientific or any other domain has long since been accepted.

(b) By the same token, keeping up with the increasing depth has been recognized as a necessity. Whatever else he may do, the investigator must penetrate the territory of the known right to the frontier, on one line at least, if he is to invade the unknown and have any prospect of discovering something new.[5]

(c) Learning and mastering the arts of inquiry (of thinking, observation and experiment, and communication, plus technique) require not only instruction but practice, and practice not only imitative but heuristic. Accordingly, the student, like the investigator, though within appropriate limits, must carry out inquiries in depth, and for this he must learn in depth.

Thus, depth cannot and must not be given up; and the student's limited capacity and time will be stretched in this direction, more and more as he proceeds to higher stages of education. Under these conditions, breadth can be obtained, as well, only by giving up the idea of covering—as it were, without leaving any large gaps—the

[5]It is assumed here, since there is no space to argue the point, that the student had best be prepared for the role of investigator, in search of new knowledge, whatever the sort of scientific or technical work he may be expected to undertake.

whole range of knowledge in all domains, in one domain, in one region or field, and perhaps even in one area or sector in some cases, until such time as the ultimate stage of single-track specialization may be reached and the student-investigator may be proceeding along a chosen path to the frontier. This last stage probably should be deferred as long as possible.

Not that such coverage, in a fairly detailed way, is not attempted even now; but what is being contended here is that, to maintain depth appropriate to the stage of education and at the same time to obtain breadth while avoiding superficiality, those who design programs and courses will have to become far more selective and may well have to leave larger gaps, filled only with connecting material, in order to choose areas or sectors in which learning can be concentrated in depth. To ensure that a sense and a grasp of the breadth, say, of a subject, are obtained horizontal connections will have to be establishd between areas or sectors of concentration. Moreover, because scientific knowledge is extremely cumulative, vertical connections will have to be maintained, and even vertical continuity. These connections, horizontal and vertical, will be determined by the means available and by consideration of what is best suited to the subject and to the stage of education.

At the present time, breadth is being sought in school and university by means of "general" courses spread thinly over a vast territory, "catch-all" courses dealing superficially with a wide variety of information, "broadening" courses made prerequisite to or necessary accompaniments of fairly specialized undergraduate education for professions, "survey" courses, and the like. The adoption of a system of concentration in connected areas or sectors, in the more extreme form here proposed, would require the radical revision of most courses of the types noted above; some probably would have to be replaced altogether, and a few would be eliminated. The selection of areas of concentration undoubtedly would be difficult in many cases; but the difficulty would be eased at the outset if the "technical" details and routines of current practice were reduced to a minimum, if the principle of fundamental focus were adopted and given effect, and if education were to get away from the idea that the student should know at each successive stage, largely for its own sake, so much specified factual information.

The unacceptable alternative to the above, so it seems to the writer, is more and more to turn out, on the one hand, products of "general" education who know very little about many things, and, on the other, products of highly specialized education who know many things about very little. Thomas Henry Huxley, the nine-

teenth century biologist and spokesman for evolution, once suggested that to be educated a man should know everything about something and something about everything. But even this has become impossible, within the period of formal studies at any rate, though not necessarily within a lifetime. In addition to languages, the arts of communication and the arts of learning-and-inquiry, the best possible command of which is essential for all, the common program of formal studies should offer depth of *knowledge* in connected areas of concentration in the central parts of the most important fields, and beyond the common program, eventually, specialization should offer great depth of *knowledge* in part of one field or in related parts of several fields. Better command of the vernacular tongue, at least, and of the arts mentioned above should be sought throughout the formal period, including the postgraduate stage, and beyond.

At this point, in the present argument, the resolution of (C)-P must be left incomplete and attention turned to the (D)-P demand for qualitatively better education.[6]

Better Education

The quality of education might be judged, within wide limits and with a large error, by means of achievement tests, say by applying tests standardized for a student population of many years ago to a sample of today's students in order to get a basis of comparison. Because of changes in aims, in curricula and in tests, however, the results would be of somewhat doubtful value. Alternatively, some general criteria might be set up for making a judgment. In the face of the accelerating growth of information, with its embedded knowledge, a single criterion, though general in nature, may be considered of primary importance. It is, briefly, how well the education prepares the student for learning, for learning in the classroom with instruction and help, but, above all, for learning on his own initiative and by his own resources. Relatively speaking, every student is woefully ignorant on leaving school or university, but by learning how to learn efficiently and effectively he will, at least, have acquired the means of reducing or mitigating his ignorance.

Speaking generally and rather abstractly, learning may be described as a process of communication and inquiry. The teacher sends messages to the student; the student picks up messages from

[6]The argument is concerned with the design and make-up of programs and courses, and to some extent with the student's use of available capacity and time, but instruction, materials of instruction and physical facilities are being excluded from its compass. The quality of instructon, of course, has much to do with the quality of education, but the relation between the two will not be discussed here.

other minds, past and present, which have been recorded in print; messages are exchanged btween student and teacher, and they pass between students; as the student reads, writes, talks and thinks as he observes and experiments, there is a flow of messages in his brain. The student learns best by inquiring, by asking questions.

In the face of the growth, then, the student, in order to secure a qualitatively better education, must gain a better command of the arts of communication and inquiry (the arts of learning). In education for scientific work, which is being considered here, the arts of inquiry must, of course, include the methods—there is no such things as *the scientific method*—of scientific investigation. Observing and experimenting and various techniques loom large in these methods. But the art of thinking stands above all, in science as in history and economics, in industry as in government, and the growth is making the command of the art of thinking more important all the time. It is well to remember, however, that thinking and communication are only separated by the artifice of words: there is a close and reciprocal relation between clear thinking and clear presentation.

While instruction helps, in the end there is only one way to improve one's command of the arts of communication and inquiry: by exercising, by practising them, less and less imitatively and more and more heuristically. This is one response which must be made, in education, to meet the demand (D)-P. Significantly enough, a growing body of evidence from research indicates that the exercise of thought increases the physiological capacity of the brain for thinking, though doubtless not beyond the individual's undetermined hereditary limit.

Growth In Mathematics

Of course, the student must have something to practise on, something to communicate, to inquire into and to think about. These things are determined largely by the make-up of the program and the courses; and it has already been shown here that the growth makes certain demands as to their make-up. But the student also needs certain instruments.

Apart from language, and disregarding material instruments because of the limits of space, the most important of these instuments in science and technology, and in education for work in these domains, is mathematics—both a science in its own right and the language of science. Since mathematics, as a field of knowledge, shows the growth, the features of growth, the effects and problems and demands of growth, already described in reference to science and technology as a whole, the conclusions already drawn, as to the

educational import of the demands, apply in general to the presentation and the learning of mathematics during the period of formal studies. In the context of the present section of this article, the student needs to gain a better command of mathematics, at least as an instrument of inquiry and as a means of communication.

Demands For Ideas

Leaving the demand for better education at this point, the writer wishes to deal briefly with one other demand, ever-present in scientific research, which the growth is strengthening; the demand for general or conceptual ideas—if possible, new ideas. This demand has been increased especially by the growing need for new mathematical methods, new modes of thought and fresh, even revolutionary, thinking to overcome the problems of complexity in systems under investigation. To some extent, conceptual ideas, even new ideas, can be picked up in science and technology; they emerge there from time to time. But scientists always have been heavily dependent on borrowing from the humanities or liberal arts. Accordingly, the student-investigator needs to study these subjects, not only for their own value to his education as a whole and to his citizenship, not only for a vaguely defined purpose of broadening his outlook, but also for their utility, because he will need to mine them for ideas, indifferent though he may be to the philosophical matrix in which the useful ideas are embedded. It could be shown, moreover, that at least some of the humanities, history, for example, show rapid growth, with their effects on scholarly endeavor, their problems and demands, and their import for education in the domain of the humanities; but that is another story.

Continuous Learning

When all is said and done, the demands arising from growth of the human inheritance of learning, though they can be partly resolved to show their import for formal education, cannot be satisfied within the limited period of formal studies. It is very doubtful, indeed, whether they can be fully satisfied within the present span of human life, especially when it is recognized that, given an upper limit to human intellectual capacity and persistent, accelerating growth of published information and embedded knowledge, without a general coalescence of disciplines, the dwarfing of the individual capacity by the output of the multitude will proceed. Under these conditions, in spite of our best efforts, we may well become, individually in relation to the whole, more and more ignorant. At all events, it is abundantly clear that the business of learning can only be started, indeed barely begun, during the period of formal

studies. Learning, therefore, must be the business of a lifetime, which re-emphasizes the conclusion, drawn earlier in the argument, that formal studies must prepare the students for learning and inquiry by his own initiative and on his own resources—with this corollary added: that education, by teaching or coaching employees, must be part of the business of private and public enterprises.

As an American businessman has suggested, when the individual graduates from high school or university, he or she is not so much equipped to do something as prepared to learn something:

> It is folly to try to equip students with memorized answers for every problem they will encounter in later life. An advancing world will not wait while one runs the file of his memory to see whether there is a ready-made answer. Proper education, whether it be scientific or otherwise, should provide an adequate background of values, thereby equipping the student to think for himself and to meet new situations in terms of broad concepts rather than in terms of dated recipes.[7]

In a world characterized by accelerating growth and change, the gravest error in education may be to attempt to prepare the student to adjust to the old society of his student days and to fill a vocational niche which existed when he was young.

[7]Ernest Mahler, president, Board of Trustees, Institute of Paper Chemistry, cited in **Chemical and Engineering News** editorial, Sept, 12, 1949.

LIBRARIES IN NOVA SCOTIAN HIGH SCHOOLS

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Libraries are becoming central in modern schools instead of peripheral, or non-existent, as they once were. The conception of how students best learn to think is changing. Instead of concentrating upon a single text, with teacher explanation and comment, students are now invited to compare texts, to search out statistical and other types of information, to weigh and organize relevant data. Not only this, but individual differences may be catered to, different talents cultivated, while good reading habits are presumably being developed.

In view of this, teachers and principals are asking what constitutes an adequate library, what space and arrangement of furniture are desirable, what sorts of books and reference materials are optimal, and by whom and under what conditions the library should be looked after. But first it is only proper to know what the present situation is, and to this end the present study was made.

Method and Sources

For the school year 1954 a thirty-six item questionnaire, prepared by Miss Gwen Smith, was transmitted, with covering letter, to the principals of Nova Scotia's forty-nine largest schools. Forty-six replies were returned. The responding schools ranged in type from Grade VII-XII units to Grade X-XII units, and in population from 29 to something over 800. Two schools of wider grade limits, and six schools of population less than 100, were excluded from consideration, leaving 38 high schools under study.

Accommodation

Of the 38 schools, 37 reported having a library and 35 having a separate room for it. One reported a partially partitioned-off room, and two regretfully confessed that their bona-fide library rooms had to be released for class use. Dimensions of these rooms ran from 3,000 square feet (very exceptional) down to 400, one indeed achieving only 144 square feet.

Seating accommodation was modest. Individual seats and individual places at tables were found separately and in combination. The median number of individual seats was 34 with a range from

105 to 10; and for places at tables, a median of 22, the range being 100 to 5. Apparently about one half of the libraries have adequate accommodation for seating a standard class of 40 pupils, though it must be recognized that the smaller schools are likely to have somewhat smaller classes. For five particular cases, 175 pupils were restricted to 10 seats and no places; 157 to 14 places; 620 to 24 places; 298 to 14 places; and 143 to 6 places. Thirty-five schools reported adequate electric lighting, three inadequate electric lighting.

Library Facilities

Tables I and II show respectively certain library resources and number of volumes on the shelves.

TABLE I

CERTAIN LIBRARY RESOURCES

Item	Yes (%)	No (%)	% Not Reporting
Library bulletin board	73.7	26.3	.....
B.B. used to publicize new reading	60.5	21.1	18.4
Up-to-date card catalogue	81.5	15.8	2.6
Up-to-date accession book	92.1	7.9	.....
Record of books withdrawn	94.7	5.3	.....
Books arranged by sections	97.3	2.6	.....
Sections labelled or marked	71.1	26.3	2.6

TABLE II

NUMBER OF VOLUMES

Volumes	Number of Schools	Percentage
8,000 up	1	2.6
6,000-7,999	0	0.0
5,000-5,499	1	2.6
4,500-4,999	0	0.0
3,500-3,999	2	5.3
3,000-3,499	2	5.3
2,500-2,999	0	0.0
2,000-2,499	4	10.6
1,500-1,999	4	10.6
1,000-1,499	13	34.2
500- 999	6	15.7
0- 499	3	7.8
Omitted	1	2.6

One school, in which the local branch of the regional library was housed, reported 1,000 volumes in the high school library and 2,000 in the regional library. The regional librarian acted as school librarian and new books were added to the regional library but not to the school library. The three smallest high school libraries reported 75, 350, and 425 volumes. The over-all average was approximately 1,200.

To the questionnaire item covering encyclopedias, dictionaries, and periodicals the following summary was obtained:

Item	Number
An up-to-date encyclopedia	37
An up-to-date dictionary	36
World Affairs	36
A French dictionary	34
Time	34
Canada Yearbook	33
MacLean's	32
Saturday Night	30
National Geographic	26
An up-to-date atlas	24
Readers' Digest	24
A German dictionary	19

Others mentioned were a Latin dictionary, Saturday Evening Post, Canadian Geographic, and Newsweek. In many cases the periodicals were contributed by teachers or other persons. One principal added, "I insisted on the Manchester Guardian and Christian Science Monitor." It may not be far amiss to conclude that the periodicals represent adult publications of the lighter, popular type, rather than publications prepared especially for adolescents.

Suggestions for new books and other materials came from teachers, administrators, and librarians, in that order but without much difference among them. Suggestions from pupils were much less frequent.

Items about the librarian yielded the following information:

Item	Yes	No	Omitted
Have a librarian?	35	3	0
Librarian also a teacher?	32	5	1
Had training in library science?	15	23	0
Full teaching load also?	25	8	5
Students act as assistants	29	9	0

Three schools had librarians who are not also teachers. Fifteen librarians had some training in library science. Most of the teacher-librarians had a full teaching load. The number of periods in the time-table free from teaching in order to carry out library duties were:

Periods free	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
Number schools	2	0	1	0	0	0	1	0	1	0	1	3	0	1	5

Twenty-eight schools out of 38 give a brief course to their students in the use of the library. In most schools, however, the students made little scheduled use of the library. The following tabulation shows how frequently teachers sent pupils to the library for specific reference reading:

	Number of Schools	Percentage
Not at all	0	0
Very seldom	2	5.3
Occasionally	17	44.7
Frequently	13	34.2
Very frequently	5	13.1
Omitted	1	2.6

Summary

1. The typical Nova Scotian high school has six grades, VII to XII, registers 400 students, enjoys a separate library with floor space of under 1,000 square feet, provides meagrely for seating accommodation, but is equipped with adequate lighting.

2. Most of the libraries have sectional (physics, history) divisions, up-to-date card catalogues, about 1,200 books, and acquire from 50 to 75 new books per year.

3. Nearly all schools have a teacher-librarian. Forty per cent of these teachers have had some training in library science, but sixty per cent of them teach full time.

DESIGN AND STRUCTURE IN CANADIAN EDUCATION

A Comparative and Historical Study

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What is the basic design in Canadian education and the typical administrative structure which gives effect to this design? This article seeks an answer to the question by comparing both design and structure in the typical Canadian province with those of a state in the United States, and by tracing historically certain changes in provincial organization for the administration of schools. Its purpose is to achieve an increased understanding of our Canadian system of school Government.

I. CONCEPTUAL DESIGN

The conceptual design in education organized in a rational system,[1] is an expression of purposes to be achieved. It is expressed through constitutional enactments, legislative statutes, and court decisions. To be internally consistent, the design should recognize only those practices that are functionally in harmony with its avowed purposes. The design is embodied in constitutional practice, in school law, and in the existing inter-relationships among governing authorities.

Despite public unawareness of the fact, each Canadian province has it own constitution. The British North America Act and provincial statutes constitute the legal framework, but custom, usage and judicial decision provide a broader scope for legislative action.[2] Unlike its federal counterpart the province has the power to amend its constitution; each provincial legislature being in effect a constituent assembly. Sections 92 and 93, Part II of the British North America Act, constitute the legal basis for provincial sovereignty by granting to provincial legislatures plenary powers within defined limits.[3] Since provincial assemblies have the power to amend the broad phases of their written and unwritten constitutional law, it is to boundaries only that provincial legislators look for limitations to the exercise of sovereign power. To quote one authority, "every legislature in Canada acting within its

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1R. R. Hamilton and Paul D. Mort, **The Law and Public Education, p. 3.**
2R. M. Dawson, **Democratic Government in Canada, p. 103.**
3**British Statutes, 30 Victoria, c.III.**

legislative sphere is sovereign, its powers are exclusive, supreme, absolute."[4]

Provincial control over education

Control over education is awarded to the provinces in section 93 of the British North America Act as follows:

> In and for each Province the legislature may exclusively make laws in relation to Education, subject and according to the following provisions:[5]

The limitations placed on the exercise of this power are contained in the provisions designed to protect the existence of denominational or separate schools legally established by religious minorities prior to confederation. These limits have, however, been clearly defined by judicial action. While French speaking citizens may, in some provinces, claim the right to separate schools as a religious minority, they have only those privileges of language which the provincial legislature sees fit to grant.[6]

Constitutional authority of state and province compared

The clear delineation of sovereign power over education granted the Canadian province contrasts sharply with the vague historical position held by a state in the United States. The American constitution as originally drafted made no specific reference to public education as a state responsibility. With the tenth amendment allocating to the states "the powers not delegated to the United States by the constitution nor prohibited by it to the states" public education as a legal function of state government was constitutionally recognized. This late recognition of state responsibility resulted in the evolution of schools in the United States being local with the state legislature frequently asserting its control after a community school system had been established.[7] In Canada, on the other hand, provincial control of education was clearly recognized by 1850[8] and constitutionally established for all provinces in 1867 at a relatively early period in Canadian history. The evolution of education in Canada was, for this reason, largely provincial.

As noted earlier the constitutions of the Canadian provinces place no restrictions on the exercise of sovereign power over education, each provincial legislature being in itself a constituent assembly. In contrast the written constitutions of many of the United States, with amendments possible by popular ballot alone, do, in some

[4]R. M. Dawson: **Constitutional Issues in Canada**, p. 57.

[5]**British Statutes**, 30 Victoria, c.III Sec. 93.

[6]Peter Sandiford, **Comparative Education**, p. 378, citing Separate School Board versus Mackell. (Appeal cases 62).

[7]E. P. Cubberly, **Public Education in the United States**, p. 52.

[8]**Statutes Province of Canada**, 13 and 14 Victoria, c.48. "An Act for the Establishment and Maintenance of Common Schools in Upper Canada, 1850."

instances, restrict, not only state supremacy in education, but the exercise of any state control in many areas. Such constitutional provisions are, however, restraints on power only as the constitutions do not enumerate the powers of the state over education.[9] State and province alike may be said to enjoy sovereign power over education within the constitutional framework that grants to each its legal existence as a governing authority.

Relationships with the federal authority

Relations with the federal authority in the exercise of state or provincial sovereignty is relevent to a study of the role of the state or province in education. In Canada the British North America Act grants to the Governor General-in-Council (the federal cabinet) the general and unqualified power to disallow any provincial act within one year of its receipt in Ottawa.[10] The original intent of this provision expressed a desire on the part of the Fathers of Confederation to exercise a careful control over the enactments of provincial legislatures.[11] The struggle between federal and provincial authorities over provincial rights is an important phase of early Canadian history. Suffice it is to say that by the turn of the century, federal disallowance was rarely exercised, the courts deciding whether or not provincial legislation was "ultra vires."[12]

The power of disallowance was revived during the years 1935-1940 when the federal government felt impelled to disallow certain experiments of the Alberta legislature in the field of economic reform.[13] This revival has forced constitutional historians to re-examine the implications of federal disallowance on the full sovereignty of provincial legislatures. Undoubtedly, the exercise of a federal veto is fraught with such political significance as to cause any government to be wary in its application. Its practical importance may eventually be that an interference with the traditional rights or liberties of British subjects is sufficient reason for disallowance.[14] Reactionary legislation in the field of social welfare, including education, could, conceivably, result in direct federal interference in provincial affairs.

Federal control over education in the United States is exercised, not through the power of disallowance, but through decisions of the Supreme Court in testing the constitutionality of state legislation.

9Walter D. Cocking and Charles H. Gilmore, **Organization and Administration of Public Education,** p. 22.

10**British Statutes,** 30 Victoria, c.III, sec's. 55, 56, 57.

11Eugene Forsey, "Disallowances of Provincial Acts, Reservations of Provincial Bills and Refusal of Assent by Lieutenant Governors since 1867," **Canadian Journal of Economics and Political Science** IV (Feb., 1938) pp. 47-59.

12Dawson, Constitutional Issues of Canada, **op. cit.,** p. 59.

13Eugene Forsey, **op. cit.,** p. 58.

14**Ibid.,** p. 50.

A state must operate its educational system within the limits of the federal constitution.[15] The increase of supreme court decisions related to education since 1920 reflects the judicial extension of the meaning of the first and fourteenth amendments of the American Constitution.[16] The following quotation expresses in judicial language the basis for these decisions evidencing a growing concern for the protection of the rights of the individual guaranteed by the constitution.

> A federal court may interfere with local school authorities only when they invade either a personal liberty or property right protected by the Federal Constitution.[17]

Federal limitations of state or provincial authority, though exercised through different legal procedures, may relate to the same concern, that of protecting individual freedom during the extension of governmental activities and of regulations affecting the social and economic life of the people. No reference is made in Canada's written constitution to civil liberties but the assurance of these liberties is inherent in Canadian government. A province could not transgress Canada's unwritten constitution through discriminatory legislation for long without interference from the federal government through the machinery of disallowance.

Relationship to local authorities

The British North America Act under section 92 awards provincial legislatures exclusive powers over "municipal institutions" and matters of "merely local or private nature" with the result that all local government derives its legal function from provincial authority.[18] Canadian provinces without exception have established special governing bodies locally in some form or another to administer education.[19] The nature of local responsibility in education was developed through legislation in Upper Canada which has served as a general pattern for all Canadian provinces with the exception of Quebec and Newfoundland.[20] Local educational authorities exercise this jurisdiction over schools by authority of the provincial legislature. They are, in reality, administrative agents for effecting provincial control of education.

While the relationship of central to local government was clearly defined early in the history of Canadian education, this has not been equally true in the school systems of the United States. Historically

15Ward Keesecker, "Supreme Court Decisions Affecting Education," **School Life** XXXI (February, 1949), p. 4.

16**Ibid.**, p. 5.

17**Ibid.**, p. 5, citing Jackson (659 ct. 461, 1948) McCallum V., Board of Education.

18R. M. Dawson, **op. cit.**, p. 116.

19**Ibid.**, p. 118.

20**Report of the Royal Commission on Education in Ontario, Province of Ontario, 1920, p. 195.**

education in most states grew up under local control, any functions performed by the state agency being chiefly clerical and statistical.[21] Supreme court decisions have, however, clarified state relationships with local districts, bringing the role of the central agency more sharply in focus. The decision of the Supreme Court of Indiana established that "it is for the law making body to determine whether authority over education shall be exercised by a state board of education or distributed to county, township or city organizations throughout the state . . ."[22] Ostensibly state control may be limited or negligible; nonetheless, local educational authorities are, in reality, state agents and are ultimately responsible to the state.[23] Nor, as has been pointed out by Keesecker in the following quotation, does the state necessarily share its power with local units.

> The authority over education has been held by the courts to be not necessarily a distributive one, to be exercised by local instrumentalities; but on the contrary a central power residing in the legislature of the state.[24]

In both province and state according to these observations the ultimate decisions affecting the control of schools lie within the prerogatives of provincial and state legislatures. These bodies may exercise their constitutional power to reorganize the structures of school government, to increase or decrease local responsibility, or to eliminate it completely, creating a system administered directly by the central authority. While tradition and custom combine to protect the integrity of local school government, its existence is dependent upon, and its authority stems from, the legislative branch of state or provincial government.

Federal decentralization

A further characteristic common to the public school system of Canada and the United States is that of federal decentralization. In both countries the provincial or state authority is accountable to "no superior tribunal in directing the course of education or for its failure to provide an adequate or uniform system of schools."[25] The right of a government to exercise this power is sometimes said to be derived from its police power, at other times "the inherent power of sovereignty to promote the welfare and happiness of the people of the state."[26] Irrespective of its source, the constitutional authority of the state and province is plenary and unquestioned.

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[21]Fred F. Beach, "The Functions of the State Department of Education," **Bulletin No. 12,** (Washington, D.C., U.S. Office of Education, Government Printing Office, 1950), p. 1.

[22]Ward Keesecker, **op. cit.,** p. 4, citing Supreme Court of Indiana (23 N.E. 946).

[23]Cocking and Gilmore, **op. cit.,** p. 9.

[24]Ward W. Keesecker, "Legislation as it Affects State School Administration, Principal Trends Across the Nation during the Past Decade," **School Life, XXXII (May, 1950),** p. 122.

[25]Hamilton and Mort, **op. cit., p. 9.**

[26]**Ibid., p. 24.**

This sovereignty of the individual state or province gives to the school system in Canada and the United States a flexibility which permits experimentation in public education without risk of damage to the entire nation. As Judge Brandeis remarked, this feature, unique to federal decentralization, makes possible novel social and economic experiments in the broad field of public welfare.[27] The conceptual design of education in both countries, while drawing its inspiration from federalism, grants sovereign power to the governments which are close to the people and capable legally of expressing the public will.

II. THE STRUCTURES OF SCHOOL ADMINISTRATION

While the conceptual design of public education in Canada and the United States is similar, the structural patterns which give effect to this common design reveal certain significant differences. As governmental organization determines the means by which legislation is made effective, the structures of government become the starting point in any comparative study of school administration. Methods of school control in public education grow from the political context reflecting basic procedures in constitutional practice.

Governmental structures in the Canadian provinces are, without exception, modelled on English law and practice.[28] The lieutenant governor performing certain symbolic functions is the ostensible head of provincial government. Executive power rests, however, with the premier and his cabinet, a body responsible to an elected legislature. The distinguishing characteristics of parliamentary or responsible government are revealed through the concentration of executive and administrative power in the cabinet membership and through a close coordination of the executive and legislative branches of government.

The founders of state government, on the other hand, avoided centralized administration, concentrating on the separation of executive and legislative powers.[29] De Tocqueville, in his shrewd analysis of American government, pointed out that the state governor represented executive power but enjoyed only a portion of its rights.[30] Non-parliamentary government, stressing the dispersion of executive authority has tended to decentralize administration, creating a multiplicy of agencies for giving effect to legislative authority.[31]

27Ward W. Keesecker, "Know Your School Law," **Bulletin, 1952, No. 4** (Washington: U.S. Office of Education, Government Printing Office), p. 4.

28Dawson, Democratic Government in Canada, **op. cit., p. 102.**

29Walter Cocking and Charles Gilmore, **op. cit., p. 40.**

30**Michigan Joint Legislative Committee on Reorganization of State Government** (Lansing: General Management of Michigan State Government, No. 1951, p. 1.

31**Cocking and Gilmore, op. cit., p. 40.**

The centralization of educational control in the provincial cabinet was inevitable in the history of Canadian education. One illustration, typical of others, drawn from the history of the provinces, bears this out. The Council of Public Instruction, an independent administrative board established by the School Act of 1850, had been delegated authority from the legislature of the Province of Canada to administer school law for Upper Canada. Further legislation in 1874 changed the character of the provincial board by introducing the elective principle for membership, and by granting it enhanced authority through the prescription of provincial courses of study and the appointment of high school inspectors.[32] Within two years, however, the Ontario legislature acting upon Ryerson's recommendation enacted legislation to transfer "all the powers and duties which the said council now possesses or may exercise by virtue of any statute on that behalf" to the "Education Department which shall consist of the Executive Council or a committee thereof appointed by the Lieutenant Governer."[33]

The increasing friction of the post-confederation period between the provincial cabinet and the Council of Public Instruction, with criticism focusing on Chief Superintendent Ryerson as the dominant force in the education board, illustrates effectively the incompatability of multiple administrative agencies under parliamentary government.[34] The provincial treasurer interfered with the financial administration of the education office[35] while the cabinet as a whole acquired statutory powers to review the decisions of both the Chief Superintendent and the Council of Public Instruction.[36] Chief Superintendent Ryerson, in protecting his legislative program, campaigned unsuccessfully to prevent the election of his severest critic, Arthur Blake, leader of the Liberal party, thereby weakening the strongest argument for the unique or separate control of education—that of political independence.[37]

Ryerson's recommendation for a change in the provincial structures of control may have stemmed from a belated recognition that the cabinet's jealous concern for its constitutional prerogative of complete executive authority made the existence of a separate administrative agency for education no longer tenable. It more likely

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[32]**Statutes of Ontario,** 37 Victoria, c. 27, part I. "An Act to Amend and Consolidate the Law Relating to the Council of Public Instruction, 1874."

[33]**Statutes of Ontario,** 39 Victoria, c. 26, sec. 1, "An Act Respecting the Education Department."

[34]J. G. Hodgins, **Documentary History of Education in Upper Canada Vol. 26, Chap. III,** citing "Correspondence between Attorney General Mowat and the Chief Superintendent of Education, 1874."

[35]Shortt and Doughty, **Canada and Its Provinces,** Vol. 18, pp. 318-319.

[36]**Statutes of Ontario,** 35 Victoria, c. 30, "An Act to Make Temporary Provision as to the Regulation of the Council of Public Instruction 1872."

[37]**Shortt and Doughty, loc. cit., p. 319.**

grew from his irritation over the obstructionist tactics followed by the newly elected members of the council who apparently opposed him in the development of council policy.[38] His recommendation was finally acted upon in 1876 when premier Alexander Mowat became fully persuaded that the province was ready to accept the administration of schools by a regularly organized government department. The result was the statutory enactment, referred to earlier, transferring the powers of the Council of Public Instruction to the Executive Council with a member of that body acting as Minister of Education.

Administrative boards for school government independent of the provincial cabinet have met similar fates throughout the Canadian provinces.[39] Miller, in a survey of Canadian education in 1913 indicated that advisory councils with membership distinct from the cabinet existed in at least five of the nine provinces but that the powers of these councils were largely nominal as far as school administration was concerned.[40] A more recent study revealed that four only of the ten provinces (Quebec, Manitoba, Prince Edward Island, and Newfoundland) make reference to these vestiges of semi-independent central authorities, and then largely as media for securing public opinion.[41] In the Canadian system of education the provincial cabinet has become, in the complete meaning of the term, the provincial board of education.

Province and state compared

The centralization of school control in the provincial cabinet emphasizes a major difference between the structures for educational administration in a Canadian province and in an American state. The state board of education in the United States had, by the middle of the nineteenth century, been transformed from an advisory board to one exercising a broad type of legislative and executive responsibility.[42] Since that time, forty of the forty-eight states have established state boards of education through constitutional or statutory provisions.[43] Any direct control exercised by the governor, the chief executive officer of the state, over the state board of

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38Hodgins, **op. cit.**, Vol. 25, p. IV.

39A similar centralization of authority, though for different reasons occurred in the North West Territories when the powers of the independent Board of Education were transferred to the Executive Committee of the Legislative Assembly, later to the Executive Council. See **Ordinances Northwest Territories** 1901, c. 29.

40James C. Miller, **Rural School in Canada—Their Organization, Administration and Supervision,** pp. 1-3.

41Canadian Bureau of Statistics, **The Organization and Administration of Public Schools in Canada, et passim.**

42Ellwood Cubberly, **State School Administration,** p. 294.

43Ward A. Keesecker, "State Boards of Education and Chief State School Officers," **Bulletin** 1950, No. 12 (Washington: United States Office of Education, Government Printing Office, 1950), Table 2, p. 11.

education, derives from his power to appoint its membership, wholly or in part. This authority exists in twenty-nine of the forty states with central boards.[44] The trend, however, is towards an elected rather than an appointed board with the governor being excluded from ex-officio membership.[45] Conflicting viewpoints exist as to the desirability of such a trend. The independently elected board, with responsibility for appointing its executive head, is favored by many educators. A more closely integrated control of all state administration by the governor receives the support generally of political scientists in their studies on state government.[46]

That education, through tradition and practice, should occupy a unique and independent position distinct from the general administration of state affairs is basic in the administrative structures of most state school systems.[47] Certain authorities on state government consider education to be a fourth department in addition to the legislative, judicial, and executive functions of government.[48] Recent studies on state leadership emphasize that the administration of education as a unique function of government is essential for its protection against partisan politics, and for the assurance of effective state programs for school improvement.[49]

By contrast education in the Canadian provinces occupies a position in provincial administration similar to that held by other government services. It is under the control of a cabinet whose existence depends on the political process and is influenced by all the pressures deriving from party conflict for popular support. The government department responsible for education bears the same relationship to the cabinet as do the departments dealing with the administration of public works, health, municipal affairs, highways, welfare, and agriculture. Provincial educational officials are civil servants subject to the same regulations for appointment and dismissal as apply to the civil service generally. The protection of education against political interference is bound up with the status of the civil service and is dependent, not on an administrative structure, but on tradition and practice in the provincial administration of schools. Education in Canada is not, nor has it been for many years, a unique function of government provincially nor does any pressure exist on the part of interested groups to make it so.

44**Ibid.**, p. 12.

45**Ibid.**, p. 9.

46E. L. Morphet, "Relationship of Education to Government, " **44 Yearbook.** National Society for the Study of Education, Part II, p. 1-54.

47**Ibid.**, p. 156.

48John R. Mathews, **American State Government,** p. 169.

49Educational Policies Commission, **Education for All American Youth, A Further Look, p. 319.**

The Chief administrative officer

The concept of an appointed chief school officer independent of political change and controversy is not unknown in the history of Canadian education. The United Province of Canada had, shortly after its establishment, made provision for such an official with specific regulatory and supervisory functions.[50] Ryerson's leadership in the office of Superintendent of Education for Upper Canada from 1846-1876 exerted a major influence on the Canadian patterns of school control. As a member of the Board of Public Instruction and as its chief administrative officer, he was responsible for the development and direction of school policy. He was, in effect, the dominant force in public education in Upper Canada for a period of thirty years. The school act of 1876, however, abolished the office held by Ryerson, placing the administration of the newly formed Department of Education under the leadership of a cabinet minister directly responsible to the Legislative Assembly.[51]

This development from the educational history of Ontario, illustrating the evolutionary process by which the office of chief school administrator became, in effect, political, is representative of a national trend.[52] A distinguishing characteristic of Canadian education is the uniformity of design in the structures developed by the provinces for the central administration of schools. With the exception of Quebec, which retains as tituler head of the department the Superintendent of Education, all provinces have ministers of education in charge of government departments[53] which exercise leadership over the provincial systems.

A comparison of chief executive officers in state and province

The position of chief executive officer in the state administration of schools has points both of similarity and difference to the office of minister of education in the Canadian province. Historically, the two offices have much in common. The first state to provide for the appointment of a chief state school officer was New York in 1812 in an act stating "that there shall be constituted an office within the state, known and distinguished as the superintendent of common schools, which superintendent shall be appointed by the council of appointment," whose duty shall be "to digest and prepare plans for the improvement and management of the common school fund, and for the better organization of the common schools.[54] The first

50**Statutes, Province of Canada,** 4 and 5 Victoria, c. 18.

51**Statutes of Ontario,** 39 Victoria, c. 26.

52The North West Territories had a Superintendent of Education from 1892 to 1901 who was replaced at that time by a cabinent minister.

53Dominion Bureau of Statistics, **op. cit.,** p. 9.

54Keesecker, **op. cit.,** p. 23 citing "The New York Act, June 12, 1812."

reference in Canadian legislation to the office of chief superintendent occurred in 1841 when the Legislature of the Province of Canada enacted "that it shall be lawful for the Governor of this Province, by letters patent under the Great Seal thereof, to appoint from time to time, one fit and proper person to be Superintendent of Education in this Province." The duties of this official as set out in the act were "to apportion in each and every year, the money annually granted by the legislature as aforesaid, among the several municipal districts in the province and ascertain the state of the Common schools therein."[55] In both state and province the major concern of these early officials was the administration of the common school fund and the general oversight of the common schools.

The position of chief state school officer has been provided for either by the state constitution or by legislative enactment in all of the forty-eight states. Thirty-three of the states make constitutional provision for a state school officer in the articles dealing with either the executive departments or education such as follows:

> The executive Department of this commonwealth shall consist of a Governor, Lieutenant Governor, Secretary of the Commonwealth, Attorney General, State Treasurer, Secretary of Internal Affairs and a Superintendent of Public Instruction.[56]

The legislature of the Canadian province, on the other hand, is under no such constitutional obligation to provide an executive officer for schools but has done so typically by statute: "There shall be a department of the public service . . . over which the member of the Executive Council appointed by the Lieutenant-Governor in Council . . . to discharge the functions of the Minister of Education for the time being shall preside."[57]

The chief school officer in the United States secures his position by one of three methods: He is appointed by the governor in six states, elected directly by the people in thirty states, and appointed by the state boards of education in twelve states.[58] The trend is towards appointment by an elected state board but, so far, this movement has not affected materially the predominant practice of electing the state administrator of schools by popular ballot.[59]

The state school officer appointed by the governor of the state presumably has a responsibility to him comparable to that held by the minister of education to the premier of the province. A state school officer so appointed is, in effect, a member of the governor's

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55 **Statutes, Province of Canada**, 4 and 5 Victoria, c. 18.

56 Keesecker, **op. cit.**, pp. 28-29, citing the "Constitution of Pennsylvania, Art. IV, Sec. I."

57 **Statutes of Alberta**, 1901 and Amendments, c. 29, sec. 3. "The School Ordinance."

58 Keesecker, **op. cit.**, p. 34.

59 **Ibid.**, p. 32.

cabinet. He does not, however, have the direct responsibility to the legislature which the minister of education in the Canadian province must always accept.

The elected chief state school officer, while unquestionably an administrative officer of the state, is by virtue of direct election in some degree removed from the control of the legislative and executive branches of government.[60] The power to make and to interpret regulations for school control accords him both legislative and quasi-judicial functions comparable to those exercised by a Canadian minister.[61] The state officer draws these powers either from constitutional provisions indicating the relationships between the legislature and administrative branches of government or from statutes of the legislature, and he exercises them in direct responsibility to the people. The provincial minister, on the other hand, is responsible only to the Legislative Assembly for his exercise of the policy-making function and for his performance of the ministerial duty.

The appointment of the chief executive officer by an elected state board of education marks the widest divergence in practice between province and state. The attempt to separate policy-making from the ministerial function, to professionalize the office and remove it from the arena of party politics places it in sharp contrast to the Canadian ministry with its politically appointed incumbent. A comparable office in Canadian school administration is that of deputy minister who, as permanent head of a department of education, provides continuity of control, technical training, and non-political leadership. The deputy is not, however, the chief administrative officer of the provincial school system but the advisor to the minister in whose name he exercises leadership over the schools of the province.

Similarities in the office of the chief school administrator in province and state grow from a common conceptual design in the school systems of the two nations. The autonomy over education vested in state and provincial legislatures creates the need for a central administrative agency with wide powers of control. Such an executive, to achieve the necessary flexibility in administration, must possess discretionary powers that imply both policy-making and quasi-judicial functions. These have been granted in most instances to the chief school officer in both province and state. The differences in the office derive from dissimilar constitutional procedures for defining relationships between the legislative and executive branches of government. The direct election of the chief

[60] Cocking and Gilmore, op. cit., pp. 43-44.
[61] Hamilton and Mort, op. cit., p. 60.

school administrator, while common in the United States, is unheard of in Canada. Further, the trend to develop an elected state board with an executive officer whose chief function is ministerial, contrasts sharply with the Canadian practice of responsible government involving a minister exercising through his department the wide powers concomitant with the principle of cabinet solidarity.

The Department of Education

The departments of education in Canada are regularly part of the provincial civil service charged with the responsibility of administering the statutory enactments of the legislature as they apply to schools. With one exception (Quebec) Canadian departments are presided over by a cabinent minister and are, in effect, an extension of his executive function. They draw their powers from his office, exercising them in his name and acting under his responsibility.[62] In short, the department of education in Canada has actually no powers apart from those accorded the minister by the legislature of the province.

A distinguishing characteristic of Canadian departments of education is the degree of uniformity that exists in their internal organization. While the allocation of specific functions to the various branches may vary, the broad divisions in the ten departments are basically similar. The emphasis placed on the central control of interna, a legacy of the Ryersonian period, has resulted in large staffs concerned with the inspection and supervision of classroom instruction. Curriculum planning, traditionally an expression of provincial administration, has, of recent years, become so involved that many provinces have set up separate branches for the development of provincial courses of study. New movements in education bearing directly on instruction, such as guidance, make their impact on Canadian schools through the establishment of directorates within the provincial departments. The traditions of provincial leadership, combined with an early acceptance of the constitutional responsibility of the province for education, have created central agencies whose leadership functions and administrative structures tend to follow a national pattern.

A comparison of function with state departments of education

The Canadian department of education exists to assist the responsible cabinet member in the performance of his ministerial function. The state department serves a similar purpose for the chief school officer of the United States. As in Canada, the education department consists of a selected corps of employees

62Dominion Bureau of Statistics, op. cit., p. 17.

charged with the responsibility for assisting the chief executive of public schools in giving effect to the school law developed by the state legislature. As the concept of functions for the central agency broadened from the statistical or recording stage through the inspectoral to the present stage emphasizing state leadership, the personnel needs of the department expanded accordingly.[63] Similarly to Canadian development the internal structures and major functions of the state department grew from the evolving concepts of the central agency's role in the total design of public education.

The functions of state and provincial departments in the field of instruction have followed similar patterns of development. A need for the regulation of secondary education led both state and provincial administrative agencies to appoint departmental officials for the inspection of higher schools. Active supervision by the central agency in both province and state started at the top of the school system. Provincial and state legislatures in both countries experimented with statutory curriculum control, a method of program planning which was ultimately to prove unsuccessful. Like its Canadian counterpart, the state department has established legally its leadership role in curriculum building and in supervision, the success of its performance in these areas being dependent on personnel. That many state departments have not expanded staffs sufficiently to provide the most effective type of leadership is, in the opinion of competent authorities, a matter of regret.[64]

CONCLUSIONS

1. The province's authority over education vested in the legislature is plenary, any constitutional limitations to this power being restrictive only.

2. Local school agencies operate by virtue of the power granted them by the provincial legislature; they are, in effect, the province at work locally.

3. The conceptual design in Canadian education involving provincial autonomy, federal decentralization, and free public education is similar to that of the United States.

4. The administrative structures in Canadian education are concomitants of cabinet government with a minister of the crown, a political figure, serving as chief executive officer of the provincial school system.

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[63]Fred F. Beach and Andrew H. Gibbs, "The Personnel of State Departments of Education," **Misc. No. 16** (Washington: U.S. Office of Education, Government Printing Office, 1952), p. 3.

[64]American Association of School Administration, "The American School Superintendency," **30th Year Book**, p. 339.

5. The differences in administrative structures between province and state grow from the basic differences in relationships between the legislative and executive branches of government typical of parliamentary and non-parliamentary forms of government.

6. The legal functions of the department of education with respect to instructional leadership typical of the Canadian province are generally those acquired by the state agency in the United States.

BIBLIOGRAPHY

A. Books

Cubberly, E. C. *Public Education in the United States.* New York: Houghton Mifflin Company, 1934. 782 pp.

———————. *State School Administration.* Boston: Houghton Mifflin Company, 1927. 773 pp.

Dawson, Robert M. *Constitutional Issues in Canada 1900-1931.* London: Oxford University Press, 1933. 482 pp.

———————. *Democratic Government in Canada.* Toronto: Copp Clark Company Limited, 1949. 188 pp.

Hamilton, R. R. and Mort, Paul. *The Law and Public Education.* Chicago: The Foundation Press, Inc., 1941. 579 pp.

Hodgins, George J. *Documentary History of Education in Upper Canada.* 27 Volumes. Toronto: Warwick Bros. and Ruffer, 1894.

Mathews, John R. *American State Government.* New York: Appelton Century, 1934. 534 pp.

Miller, James C. *Rural Schools in Canada, Their Organization, Administration and Supervision.* New York: Bureau of Publication, Teachers' College, Columbia University, 1913. 236 pp.

Sandiford, Peter. *Comparative Education.* London: J. M. Dent and Sons, 1918. 500 pp.

Shortt, Adam and Doughty, A. G. *Canada and Its Provinces.* Vol's XVIII, XIX, XX. Toronto: Edinburgh University Press, 1914.

B. Periodicals and Other Publications

American Association of School Administrators. "Amercian School Curriculum," *31st Yearbook.* Washington: The Association, National Education Association, February 1953. 551 pp.

———————. "The American School Superintendency," *30th Yearbook.* Washington: The Association, National Education Association, 1942. 663 pp.

Education Policies Commission. *Education for All American Youth, A Further Look.* Washington: Educational Policies Commission of the National Education Association, 1952. 402 pp.

Forsey, Euguene. "Disallowances of Provincial Acts, Reservations of Provincial Bills and Refusal of Assent by Lieutenant Governors Since 1867." *Canadian Journal of Economics and Political Science,* IV (February, 1938), pp. 46-59.

Keesecker, Ward W. "Legislation as it Affects State School Administration, Principal Trends Across the Nation," *School Life,* XXXII (May, 1950), pp. 122-124.

———————. "Supreme Court Decisions Affecting Education," *School Life,* XXXI (February, 1949) pp. 4-7.

Morphet, E. L. "Relationship of Education to Government." *44th Yearbook Part II,* National Society for the Study of Education. Chicago: University of Chicago Press, 1945. pp. 153-188.

C. Government Publications

Alberta, *Statutes 1906-1955.*

British *Statutes,* 30th Victoria (1867) (British North America Act).

Canada, Bureau of Statistics. *The Organization and Administration of Public Schools in Canada.* Ottawa: King's Printer, Government of Canada, 1952. 312 pp.

Michigan, General Management of Michigan State Government. *Joint Legislative Committee on Reorganization of State Government.* Lansing: State of Michigan, 1951, 51 pp.

North-West Territories, *Ordinances 1884-1901.*

Ontario, *Statutes, 1807-1876.*

Ontario, Royal Commission on Education, *Report of the Royal Commission on Education in Ontario.* Toronto: King's Printer, 1950, 932 pp.

Province of Canada, *Statutes, 1841-1867.*

United States, Office of Education. Cocking, Walter D. and Gillmore, C. H. "Organization and Administration of Public Education." *Staff Study No. II.* Washington, D.C.: Government Printing Office, 1938. 183 pp.

United States, Office of Education, Beach, Fred and Gibbs, A. H. "The Personnel of State Departments of Education." *Misc. No. 16, Washington,* D.C.: Government Printing Office, 1952. 81 pp.

United States, Office of Education. Beach, Fred. "The Functions of the State Departments of Education." *Bulletin No. 12,* Washington, D. C.: Government Printing Office, 1950, 81 pp.

United States, Office of Education. Keesecker, Ward, "Know Your School Law." *Bulletin 1952 No. 2.* Washington, D.C.: Government Printing Office, 1952.

United States, Office of Education. Keesecker, Ward. "State Boards of Education and Chief State School Officers." *Bulletin 1950 No. 12.* Washington, D.C.: Government Printing Office, 114 pp.

THE DRUMMER

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Spring in the Canadian woods is ushered in by one of the most thrilling sounds that can be heard in the great outdoors. This is the season when the Ruffed grouse (*Bonasa umbellus*) sends from his mossy log those matchless reverberating throbs which announce that winter has had his sway and must yield, yet once again, to the most delightful season of the year.

I say 'Canadian woods' advisedly since, though of very restricted territory and non-migratory in habit, the Ruffed grouse is one of Canada's most widely distributed birds. This species occurs in wooded areas from the shores of the Pacific to those of the Atlantic and from our southern-most border to the tree limit in the north. It seems safe, therefore, to say that untold thousands of people have quickened to his stirring beat. The literature of the outdoors is replete with reference to the miniature thunder which rolls through our woods when once again the warm sun begins to assert its authority.

Myriad are the theories which have been advanced to explain the mechanics responsible for the remarkable thumping sounds produced by the cock of the species. Some have contended that the bird strikes the breast feathers forcibly, each successive stroke initiating a resultant thump. Others have advanced the idea that the sound results from the wings striking together physically, either behind the back or in front of the breast. People who have only heard the sounds but not witnessed their generation are apt to suggest that the bird mounts his log and proceeds to strike his wings against it. There are undoubtedly several reasons for this lack of concurrence. Many of the observers have viewed the spectacle from a distance and few have had sufficiently sensitive film or high-speed lenses capable of recording the event. Even those fortunate enough to observe the phenomenon at arm's length have found the wing-beat so powerful and swift as almost to defy the eye in following the finest details. Today, with a modicum of patience and at little expense, naturists may both observe and photograph this fascinating phenomenon at close range.

One must first locate a drumming bird. At present this is a relatively simple task since the population cycle is on the up-surge. Although the species beats pretty well throughout the day, the performance appears to peak in the early morning and again in the evening. In our latitudes, April and May are the most fruitful

months to attend this singular musician. Although the throbbing sound carries easily for half a mile, it has a distinctly ventriloquial quality which often makes it difficult to ascertain the exact direction from whence it comes. A little care and patience will overcome this difficulty. If you proceed with caution and alterness when the bird is busily engaged, you stand a fair chance of discovering him upon his favourite log. However, remember that shyer individuals are apt to slip soundlessly from their thrones at your approach—mute evidence of alarm. When this occurs, one has but to search the vicinity, carefully examining every windfall. At length the drumming log will be discovered—usually a fallen monarch of the woods, richly moss-grown except for a single bare patch much worn from recent use. Additional evidence of the presence of drummers is supplied by the abundance of greyish-white droppings on either side of the log.

For purposes of close observation and photography, a blind is indispensable. This is a simple and portable structure which anyone can construct at small outlay. Purchase ten yards of light-weight canvas and four dowels each about six feet in length and an inch in diameter. Cut the ten-yard length of canvas exactly in half and cross the resultant halves at right angles, the whole forming a sort of maltese cross. Run a seam around the square at the centre, stitch the adjacent free edges firmly together, cut observation slits in the sides and your blind is ready for use. The time and effort so involved may be the most fruitful ever expended.

Initially, the blind should be erected at some dozen yards from the drumming log and left there for two or three days until the bird accepts it as a normal part of the environment. At the end of such time, it may be moved closer, say half the distance to the log. The final move which may be made a day or two later might well bring the blind to within four feet of the drumming site. Be sure to check light direction and remove offending branches if photography is anticipated.

It is best to occupy the blind alone as even slight noises may alarm the returning bird so that your tenancy is unrewarded. Either enter it very early in the morning before the sky has lightened or have a companion serve as escort. In the latter case, both parties should enter and remain until the photographer has set up his equipment and focussed on the exact area used by the drummer. When all is in readiness, the companion should leave as conspicuously as possible. It is well to equip the blind with a comfortable stool such as an old nail key as at times the wait is somewhat protracted. A sandwich and a thermos of hot coffee prove most welcome on cooler mornings.

You are about to have a thrilling experience. Keep your ear finely attuned, as the drummer always announces his return with a swift rustle of leaves as he hurries directly to the drumming log. With a light leap, he mounts and struts warily to the accustomed spot, his whole mein suggestive of extreme circumspection. His golden eye carefully inspects every point of the compass as though to pierce the depths of the woods for hidden danger. Apparently reassured, he sets his toes firmly into the worn area slightly forward of the summit, erects his crest and flattens his magnificent fan, spread broadly upon the surface of the log. At the first powerful stroke of the wings, he assumes a more erect posture as though driven upward by the forces released. A resounding explosive thump follows immediately upon the wing beat, although so swiftly do the wings return to trailing position at the sides that details are almost imperceptible. And now the wings move forward and upward in complete unison increasing in tempo until they become but a blur, the individual thumps coming faster and faster until at length they blend in a steady roar. Throughout, the head is held absolutely motionless while the breast feathers are visibly parted, horizontally, by the release of the compressed air responsible for the resounding thumps. At the conclusion of the drumming, the cock pitches slightly forward, raising his partially spread tail and puffing out his breast feathers in a great rounded cushion. Checking one's watch, one notes with astonishment that the entire performance has consumed scarcely eight seconds. Eight seconds during which one scarcely dared breathe.

Nor is your drummer loath to provide you with an encore. A score of repetitions allows you to analyse the details. The thumps become definitely associated with the forward stroke of the wings and the resultant compression of the air. Each time the performance is exactly as before. Only the first few and the very last strokes can be at all clearly followed. High speed "strobe-light" alone is capable of 'freezing' the exact details upon sensitive film. Only then do you become aware of the extent of the backward sweep of the wings, the exquisite symmetrical spread of primaries, the great cupped bow of the wingtips as they sweep forward and upward compressing the air between the wings and body.

Only after your drummer has left his vantage point to forage for food do you breathe naturally again. Thereafter, when woods turn to pale misty green and muffled thunder echoes throughout their depths, you will pause and wonder. In your mind's eye, you will reconstruct the event. Once again, your first drummer will mount his mossy log and drum his defiance to all rivals in the areas as he stakes out his claim to his territory.

THE NATIONAL FOUNDATION FOR EDUCATIONAL RESEARCH IN ENGLAND AND WALES

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Educational research in England and Wales remained a function of the universities and local authorities long after the Scottish Council for Research in Education had come into existence in 1928. Prior to the outbreak of the second great war a committee, originally set up to supervise the Carnegie Corporation enquiry into scholastic examinations in England and Wales, became convinced of the need for a national research organization. It secured an award of $10,000.00 for this purpose from the Carnegie Corporation on the understanding that a similar amount would be raised in England. It was understood that the fund should be administered by the Institute of Education of the University of London, acting on the advice of an Advisory Council representing the main interests concerned with education in England and Wales. After much delay occasioned by the war the Advisory Council met in January, 1943, under the chairmanship of Sir Fred Clarke. It approved the organization of the Foundation for Educational Research as a 'representative and autonomous body' for the planning and prosecution of research in cooperation with the research staff of the Institute of Education. A full time secretary was appointed in 1944. Generous donations were received from the Leverhulme Trust, the National Union of Teachers, and other bodies. Under the Education Act of 1944 power was granted to local education authorities to provide funds for research purposes.

In December 1945 a conference was called at which representatives were present from the universities, local education authorities, national associations of teachers and the original Advisory Committee. At this meeting the National Foundation for Research in Education in England and Wales was formally organized on an non-profit basis with corporate memberships for the universities, educational authorities and teachers' association. Individual memberships were open to persons interested in education. The council of the Foundation was to be fully representative of the corporate membership, and to include representatives of the Ministry of Education and co-opted individual members. Its functions were as follows:

1. to conduct, or assist in the conduct of, research and the publication of findings,
2. to act in liaison with international bodies interested in research,

3. to act in liaison with other national research bodies,
4. to act in an advisory capacity with the Ministry of Education in matters of research, and
5. to act as a means of interchange of educational ideas.

The conference authorized an executive committee to proceed with the organization of the National Foundation For Educational Research. Provision was also made for the establishment of a Welsh section to deal with matters pertaining to educational research in Wales.

In April 1947 the Foundation became an entirely separate and self-governing organization and assumed complete control over its own finances, which had, to this point, been managed by the Institute of Education. A constitution was adopted which was in harmony with the wishes expressed by the conference of 1945.

Permanent quarters were secured in 1946 on Wimpole Street. A lease of the property for 999 years was purchased with money loaned by the National Union of Teachers.

The financial arrangements of the Foundation were soon placed on a satisfactory basis. In the year of 1948, the first year for which an annual statement is immediately available, income reached the level of £12,076, coming mainly from contributions of corporate members, local educational authorities, universities, national association of teachers, and a grant from the Ministry of Education based on an assessment of the present and proposed program of the Foundation. The 1956 annual statement reveals income from grants and subscriptions of approximately £21,000. It is important to note that notwithstanding the amount of individual contributions no organization nor body has the authority to interfere with the autonomy of the Foundation.

The research program commenced while the organization of the Foundation was still in progress. Three principles of operation were accepted early in its history.

First—that most worthwhile research undertakings are of three to four year's duration.

Second—that for each approved research project an advisory committee must be created from representatives of the universities, the local education authorities, the teachers, and the Ministry of Education, all having special knowledge of the problem under study.

Third—where possible a competent scholar be appointed as research officer in charge of each project. This usually entails the temporary release of the appointee on leave of

absence from his normal occupation for the period required for completion of the study.

A brief summary of research follows. Not pretending to be complete, it is limited to the period ending in March, 1956.

Cumulative Records for School Pupils One of the earliest activities of the Foundation was the development of a set of cumulative records and explanatory booklets on three levels: the School Record (Infant), the School Record (Junior), the School Record (Secondary). These individual records have been widely purchased by local educational authorities.

The Use of Visual Aids in Education A questionnaire study of the use of visual aids was completed and the results circulated among educationalists of England and Wales. Three short term investigations were then authorized involving the utility of films and film strips in the schools.

The Use of Rewards and Punishments in the Schools A pilot study of this problem was so successful that it was duplicated on a much larger scale in England and Wales. Cooperation of guidance clinics, remedial education centres and staffs of schools for the maladjusted was obtained. Studies were also launched into the relative frequency of certain types of misdemeanors and the attitude of educationalists toward the use of corporal punishment in the schools. Sociological and administrative aspects of the problem have also been studied.

The Stead Memorial Research into the Content and Method of the Modern Secondary School This was a study conducted in four modern secondary schools. It is available in published form.

Problems Distinctive of Educational Life in Wales This study resulted in the preparation of bilingual pupil records for infant, primary and secondary schools. It is too early to report on experience of their use.

Dr. Jenkins' Non-Verbal Test of Mental Ability The Foundation produced a test of non-verbal intelligence from the late Dr. Jenkins' materials, involving responses to five different forms of logical thinking. It was standardized and norms developed, and then was made available to the schools. A similar test has been produced for use in secondary schools.

"List of Researches in Education and Psychology Presented for Higher Degrees in the Universities of the United Kingdom, Northern Ireland, and the Irish Republic from 1918 to 1948" Mrs. A. M. Blackwell. Since 1948 two supplements have appeared making the list complete to the end of 1955.

Allocation of Primary School Leavers to Appropriate Secondary School Courses An interim report on this, the largest Foundation project to date (1950) has been published. It reports on the use of non-verbal tests in primary school and the differences in results of non-verbal and verbal tests. Futher studies of a 'follow-up' nature have been made of the relation of these differences to later achievement. A large scale study is also being made of the part which objective tests can play in the prediction of later achievement when used in courses for primary school leavers. A further study will be made of the effects of such qualities as intellect and character and of environmental influences upon school achievement.

Educability of Children Suffering from Spastic Paralysis This study was completed in 1950. It provides an improved procedure for classification of spastic children. The discussion of their range of capacities and of appropriate educational provision for their needs is a contribution to educational practice.

Intelligence Tests For Blind Children The adaptation of an individual intelligence test for use with blind children aged from four to sixteen years permitted an examination of over 1,000 cases. Clear differences have been revealed between the totally blind and the partially sighted, with the blind superior on verbal tests and the partially sighted better in performance. Further studies are in progress.

The Respective Merits of Greek and Latin as the Basis of the Classical Type of Education This was one of the earlier studies of the Foundation. It sought to compare the effects of the two languages on the capacity of grammar school pupils to think clearly about current affairs. As the results were somewhat inconclusive the report has been filed for reference.

The Twickenham Studies Arising out of the earlier studies of allocation of primary school leavers, a follow-up study was made of 1,500 pupils leaving primary school in 1951, and a similar group leaving in 1952. There was also a follow-back of pupils already in secondary school who were doing work which was markedly superior or inferior to that expected from their previous educational records. A more extensive study is to be made of 250 of the 1951 primary school leavers. Further studies are in progress.

The Effects of Coaching on Test Results This study suggests that the effects of coaching for grammar school entrance examinations may have been seriously underestimated.

National Surveys of Ability and Attainment This is a cooperative study from which interesting results may be expected in 1957.

National Survey of General Ability and Attainment in Reading and Arithmetic at 7 plus, 10 plus and 14 plus This is a survey at three levels of the relationship between general ability and attainment in the basic skills. It is being pursued with specially constructed tests in a sampling of pupils throughout England and Wales.

For the information of students of research it is to be noted that, unlike its Scottish counterpart, the British Foundation has accepted an important role in test construction since the formation of a Tests Division in 1950. Since that time five standard batteries of tests, Verbal, English, and Arithmetic, have been developed for allocation purposes at the age range of 10.00 to 11.11. Verbal and non-verbal tests of general ability have been produced for primary and secondary schools as well as tests of spatial and clerical capacity. In addition the Foundation acts as sole agent in the United Kingdom for the tests produced by the Psychological Corporation of America, and by the Australian Council for Educational Research.

Another feature of the development of the Foundation has been the discovery that a research library is vital to the efficient pursuit of the research program. Early in its history, when this point was conceded, an adequate library of references and journals was planned and, by degrees, has been achieved. This, together with a library of testing instruments, proves a valuable aid to the research officers in charge of ongoing projects.

A summary of the principles and practices of the National Foundation for Educational Research in England and Wales will focus attention on a number of matters which are of importance to similar organizations in Canada.

1. **The autonomy of the Foundation** Despite direct contributions from the universities, local educational authorities, teachers organizations and other bodies, no direct influence may be exerted by any group upon the program and activities of the Foundation.

2. **The Search for Appropriate Research Problems** The search for suitable and timely research problems may be illustrated by a conference held in 1954. Fifty-four individuals interested in problems of selection of students for secondary education were drawn from the universities, departments of education, inspectors of schools, administrators, head masters and teachers' associations. The conference located problem areas, set up 'working parties' to explore two major problems, and generally advanced toward a position where major studies might be initiated.

3. **The Length of the Average Study** There was early acceptance of the fact that suitable research projects would take from three to four years for completion.

4. **Research Advisory Committees** The practice was established of appointing an advisory committee for each research project, composed usually of representatives of the universities, local education authorities, the teachers and the Ministry who have special knowledge of the problem under study.

5. **The Appointment of Research Officers** Where possible a competent research officer is appointed to head each research project. This necessitates the securing of leave of absence for full time direction of the study. The practice assures continuous direction and control and reduces waste, delay and inefficiency.

6. **The Tests Division** Contrary to Scottish policy the Foundation discovered a need for British tests with British norms, and information about testing generally. They have established an extremely active division to serve these needs. They also represent an American test organization and the test division of the Australian Council on Educational Research.

7. **The Research Library** Experience revealed that an extensive research library was vital to the conduct of research and the construction of tests. Since its cost is small in relation to expenditures on major projects it must almost be regarded as a necessity in any effective research organization.

8. **Financial Support for Research** The practice of local education authorities making grants to the Foundation in terms of the number of pupils in attendance was written into the first Constitution. This arrangement permits the council to anticipate income and budget more precisely than would otherwise be the case.

The strength of the National Foundation seems to rest in its autonomy and the adequacy of its financing. Probably more important is the genuine acceptance of its importance by Ministry, universities, local education authorities, and teachers organizations, an acceptance which is evident both in the amount of financial aid granted and in the seconding of valuable scholars for temporary service on Foundation projects. Of significance also is the fact that the selection of projects is made in terms of the needs of the educational system as revealed spontaneously or in answer to systematic search conducted by the Foundation.

BOOK REVIEW

CRESTWOOD HEIGHTS: A NORTH AMERICAN SUBURB by John R. Seely, R. Alexander Sim, and Elizabeth W. Loosley. Toronto: University of Toronto Press, 1956, pp. 505. $6.50.

If you are interested in a living, moving panorama of existence in an upper-class Canadian community you will find it in **Crestwood Heights.** This community, about forty per cent Jewish, and appreciably wealthy, occupies a small but elevated section in one of Canada's largest cities. The men carry on their business and professional activities mainly in the big city below; the women adorn and dominate their homes on the heights; the children attend and are absorbed by the schools.

In a society, competitive, with steadily rising standards, with no comfortable traditions, family fortunes run with the father's income. He must keep to the treadmill, improve his position as may be, but continuously produce wealth. Relaxation, recreation, avocation, if essential, are still secondary. There is no standing still. The mother, rather less from preference than from paternal abdication of authority, assumes the family role of both parents, managing home, servants (when they can be got) and children. The husband, decently producing wealth in his own way, and the wife, decently spending it in the right way—this is the bright picture of success in Crestwood Heights.

Decency is central to this composition. Puritanism may appear somewhat vaguely in the background, as a ghost ought to do, but squarely in front is the goddess, respectability. From a distance, supporting this central figure, from the wings so to speak, are the church and the synagogue. Their roles are ancillary. The goddess herself stands squarely upon the white pedestal of Victorianism. Respectability is a condition and mark of success.

Designed as a five-year study of the impact of an upper class culture upon the lives of children (mainly children in school), the field inevitably encompassed the schools themselves, teachers, homes, parents, churches, clubs and organizations of many kinds, playing fields, and even the University to which most of the youth aspire to go. In some thirteen chapters, two appendices, and almost sixty pages of notes, these repositories or emblems of culture are delineated.

Chapter I, **The Stage,** invites the reader to a consideration of some problems in social research. Sampling, for instance. Is the community under study typical of a country, of a city, or even of

an upper-class community anywhere? Obviously no one knows. Crestwood Heights may be an isolate, though many comparably placed and similarly favored communities have existed from the earliest times. Or closer home, did the study 'see' typical people, or record typical things about them?

If sampling is in question, perhaps the community is critical or crucial in some sense? The authors think so: it harbors Jew and Gentile; its influence as a standard or norm for other communities is assured because of the high proportion of leaders in society and industry which its favorable conditions guarantee; its freedom from privations warrants the assumption that whatever social pathology appears is not the consequence of destitution or material want.

The community gave willing cooperation in this study. The citizens, including children, subjected themselves gladly to interview, to group discussions, and produced volumes of information about their daily selves, daily activities, and no less about their fears, doubts and aspirations. Indeed, as might be expected, many of them, over this five-year period, came to look upon members of the team as father confessors, seeking advice and aid in their more troublesome problems.

Whether this community, indeed whether any community, will respond with joyfulness to the report is not in the record. The picture is not flattering, but intended in fact to be as thoroughly objective as reports made by people can be about other people of the same culture. In any event, along with a rich urbanity is found an intellectual superficiality; respectability without deep moral conviction; tact, courtesy and generosity with an eye to the impression created; and sociability in the service of good public relations. Perhaps this is too close to any middle and upper class morality to be comfortable. The reader must examine his own motives.

But the project was directed primarily to the study of children—"to see what could be added to the armament of a good school system that would make its contribution to the mental health of its pupils greater or better . . . . to provide pictures of the growing-up process . . . ." In the sequel this undertaking disclosed the second motive energizing this community. The first was success, the second maturity. By maturity is meant simply that childhood is important, not for itself, but as the stage preparatory to a successful maturity. Childhood means engaging in the right activities (those approved by child psychologists), learning useful social techniques, making the best friends, but above all in making the best possible grades in school, and so through matriculation to university or to a well-prepared entry into business. Parental approach to this problem, in

the best modern tradition of pedagogy, abjured blows, mental cruelty, compulsion and bribes. It depended rather on a steady manifest concern, steady encouragement, planned counselling, and strong school support.

Crestwood Heights, as the record of a five-year study, has been criticized because it embraces only a small community, and possibly an atypical one at that; because it lacks the objectivity thought the hall-mark of scientific reporting; because it fails to pin-point Jew and Gentile relationships; and finally because no clear-cut conclusions emerge.

The project was in actuality the sole issue of an ambitious—perhaps grandiose—scheme proposed by the National Committee for Mental Hygiene (Canada), to 'attack' a number of Canadian communities simultaneously. The only-child offspring thus lacks sibbling benefits of comparison, contrast, and stimulation.

Not only were all these limitations recognized by the authors, but as far as possible reckoned with and compensated for. The result is a narrative of daily life rich in detail, temperate in spirit, and profound in understanding.

H. E. Smith.